

ABSTRACT

The present invention provides a MEM system (10) having a platform (14) that is
5 both elevatable from the substrate (12) on which it is fabricated and tiltable with one, two
or more degrees of freedom with respect to the substrate (12). In one embodiment, the
MEM system (10) includes the platform (14), a pair of A-frame structures (40), and two
pairs of actuators (30) formed on the substrate (12). Ends (46A) of rigid members (46)
extending from apexes (40A) of the A-frame structures (40) are attached to the platform
10 (14) by compliant members (48A, 48B). The platform (14) is also attached to the
substrate (12) by a compliant member (48C). The A-frame structures (40) are separately
pivotal about bases (40B) thereof. Each pair of actuators (30) is coupled through a
yoke (32) and displacement multiplier (34) to one of the A-frame structures (40) and is
separately operable to effect pivoting of the A-frame structures (40) with respect to the
15 substrate (12) by equal or unequal angular amounts. Upon pivoting, the A-frame
structures (40) act as lever arms to both lift the platform (14) and tilt the platform (14)
with respect to the substrate (12) with at least one degree of freedom. Since the platform
(14) lifts up from the surface of the substrate (12), it may be tilted at large angles with
respect to the substrate (12).